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NUCLEAR DEVELOPMENT AND PROLIFERATION

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SWISS FIRM DISCONTINUES SALE OF NUCLEAR COMPONENTS TO PAKISTAN

Paris LE FIGARO in French 17 Mar 81 p 3

[Article by Laurent Mossu: "Following an Attack A Swiss Firm Discontinues Supplying Nuclear Components to Pakistan"]

[Text] Geneva--Surrendering to pressures and threats of new attacks against its employees Cora (Engineering A.G.), a Swiss firm, has discontinued the delivery of nuclear technology to Pakistan.

On 20 February 1981 one of the firm's technicians was the victim of a bombing attempt at his home in Ziezers, Grison Canton. Credit for the attack was claimed by an anonymous caller who threatened other attempts if business dealings continued with Islamabad.

The Cora Corporation had signed an agreement in 1978 for the delivery of various components to the Nuclear Center at Kahuta about 40 kilometers from the Pakistani capital. Their employment for non-military purposes was assured by Pakistan, but this was questioned by some quarters and particularly by the United States. The green light which was given by the Swiss authorities to this sale gave rise to a very lively exchange between Washington and Berne.

Following suspension of all nuclear cooperation with the Swiss Confederation, the Carter administration examined the Swiss position and accepted the merit of the guarantees given by the Swiss. It is apparent that these guarantees did not satisfy everyone.

Official and private circles are cautious about advancing any hypothesis concerning who is behind the bombing. It is astounding that these methods are employed in a nation that strives to respect the strictest neutrality in accordance with its Constitution. The fact remains that by means of threats and intimidation Pakistan's opponents have benefitted.

CSO: 4200

ATTACKS ON COUNTRY'S ATOMIC PROGRAM REJECTED

Rawalpindi TAMEER in Urdu 13 Feb 81 p 2

[Text] Pakistan has again denied Zionist propaganda indicating that it was cooperating with Libya in developing atomic technology and preparing for setting off a nuclear device. This propaganda has been repeatedly denied by responsible quarters both in the Libyan and Pakistani governments. But this propaganda is waged with great intensity, and the Government of Israel has even had the temerity to write an official letter to the Secretary General of the United Nations charging that the Government of Libya had cooperated with the atomic program of the Government of Pakistan and tried to obtain atomic weapons.

Very few countries have had this privilege. Pakistan has repeatedly proposed setting up zones free of atomic weapons not only in Southeast Asia but in all areas. Pakistan has declared its readiness to open its peaceful atomic energy program to international inspection whereas Israel and other countries have followed an opposite policy. If in spite of this, countries like Israel want to continue their propaganda against Pakistan, then Pakistan can only ignore them.

It is unjust to allow atomic technology or any other technology to remain the monopoly of a few countries. It is the right of every country to try its best to enter the modern era; if any country regards atomic weapons as necessary to preserve its national interests, then no one has the right to raise any objection unless countries armed with atomic weapons declare such weapons illegal. People of even ordinary intelligence realize that countries like Pakistan cannot bear the burden of building atomic weapons without courting economic disaster. It is also a fact that Islamic countries have as much right to atomic technology as western countries. There is no such cooperation between Libya and Pakistan; but if in the future Pakistan should cooperate with Libya or any other Muslim country in this regard, it would be the concern of these two countries alone. A third country would not have the right to object, especially a country that is itself preparing atomic weapons with the aid of others.

9783

CSO: 5100

CSSR-USSR NEGOTIATIONS, NUCLEAR ENERGY TO 1990 VIEWED

Prague RUDE PRAVO in Czech 29 Nov 80 p 1

[Report from Moscow on 28 November by Czechoslovak Press Bureau reporter Josef Freith]

[Text] The signing of the final protocol on Friday concluded negotiations between delegates of the governments of the CSSR and the USSR--Deputy Premier of the CSSR Government, Josef Simon and Deputy Premier of the Council of Ministers of the USSR, Vladimir Novikov--regarding implementation of the program of cooperation between both countries in the development of nuclear energy in the CSSR through 1990.

The government representatives dealt with the entire scope of problems connected with implementation of the nuclear program in the CSSR, from problems encountered in development, research and production of nuclear installations, construction and utilization of capacities through scientific and technical cooperation and joint action of state control agencies. They further considered the specifics of implementation of Soviet-Czechoslovak agreements regarding the construction of nuclear power plants in the CSSR and stated with satisfaction that the V 1 nuclear power plant at Jaslovske Bohunice, with an output of 880 megawatts, which was activated in May of this year, operates reliably and has already produced over 6 billion kilowatt hours of electricity. Construction of the V 2 nuclear facility in Jaslovske Bohunice and in Dukovany is in full swing.

The parties agreed to form a centralized group of Soviet specialists in Czechoslovakia who will provide technical assistance in the construction and operation of the V 1 and V 2 nuclear power plants at Jaslovske Bohunice and, eventually, also at Dukovany and Mochovce. The intergovernmental agreement regarding cooperation in the construction of a nuclear power plant at Mochovce in southern Slovakia was signed on Thursday. It involves a power plant with an output of 1,760 megawatts with four VVER 440 type reactors.

A cooperation agreement on the construction of a Czechoslovak nuclear power plant with VVER 1000 reactors (with an output of 1,000 megawatts) at Malovice in southern Bohemia, was also negotiated in the discussions.

The objective pursued by government representatives of both countries is to secure the specific implementation of the program for construction of [additional] nuclear capacities in Czechoslovakia, which was signed in June by the premiers of both governments, Comrade Josef Simon told reporters of the Czechoslovak Press Agency after the conclusion of the Moscow negotiations. At their first work meeting, both representatives dealt with the entire set of problems regarding the Czechoslovak nuclear program which can be summarized under three basic areas: continued progress of the construction of nuclear facilities at the Jaslovske Bohunice V 2 power plant and at Dukovany; preparations for construction of additional nuclear power plants in Czechoslovakia, i.e., at Mochovce and Malovice and, finally, problems of cooperation and specialization in the production of nuclear installations and acquisition of capability for the production of the type VVER 1000 nuclear reactors. They also discussed extensive international cooperation by CEMA member countries.

Comrade Josef Simon remarked further that in the case of Czechoslovakia, nuclear energy will have to provide a decisive share of the increments in the production of electric energy in the next five-year plan and practically all of the increments in subsequent years. From this viewpoint, the current negotiations with the Soviet Union are of extraordinary importance and have been very fruitful. The intergovernmental agreement regarding cooperation in the construction of the nuclear power plant at Mochovce in southern Slovakia launches the next stage of cooperation. The first unit at Mochovce will be activated in 1986.

"At the same time we agreed," said J. Simon further, "on preparations for the next, substantially new stage, of construction of nuclear facilities in Czechoslovakia: This involves the first Czechoslovak nuclear power plant with reactors having an output of 1,000 megawatts, which is to be built at Malovice in southern Bohemia. The agreement outline is complete and after approval by the CSSR Government we should sign it at our next meeting. We also had an opportunity to visit the institute of the general designer. All the technical aspects are now clear and our key task now is to do all we can to acquire the requisite capability to produce 1,000-megawatt units and make preparations for the construction of the Malovice facility, because the Czechoslovak economy is in dire need of electricity produced by nuclear power plants.

8204

CSO: 5100

COBOEN SEEKS TO INTENSIFY EFFORT IN NUCLEAR DEVELOPMENT

La Paz PRESENCIA in Spanish 11 Mar 81 p 8

[Text] The Bolivian Nuclear Energy Commission (COBOEN) has informed the National Economic and Planning Council (CONEPLAN) of the "need to initiate the accelerated and coordinated development of nuclear energy based on proposals and documents" which the Commission presented for the consideration of government decision-making organizations.

On Friday, COBOEN authorities presented CONEPLAN with a diagnosis of that entity, its current situation and short-, medium- and long-range plans. Joining COBOEN were the Mining and Metallurgical Research Institute (IIMM) and the Bolivian Geological Service (GEOBOL).

COBOEN directives explain that at the present time, "there is a lack of knowledge of the strategic nature of nuclear activity and a lack of any national policy to guide the development of nuclear energy or any legal-functional structure."

Solutions

The document presented to national authorities by COBOEN proposes that "based on the human resources and infrastructure existing in the Bolivian Nuclear Energy Commission, we must initiate the accelerated and coordinated development of nuclear energy, implementing the proposals and documents presented by COBOEN following approval by its board."

COBOEN states that as the basis for future national nuclear policy, it is necessary to gain approval of the lines of institutional policy drafted by COBOEN, which is based on the national development policy and compatible with mining-metallurgy, energy, health, agricultural, investment and national security policies.

It also asks that nuclear energy be declared as being a "national need for the country's development and security."

Exploration

The COBOEN document states that prospecting and exploration for radioactive minerals should be the responsibility of the Bolivian Nuclear Energy Commission working by itself and/or through special contracts with foreign enterprises.

During their report, COBOEN officials noted that above all, it is a matter of preserving the country's sovereignty and protecting possible deposits of radioactive minerals existing within the national territory.

So-called special contracts with foreign enterprises operating with risk capital will be implemented, ensuring that there "be no risk of compromising national sovereignty or the slightest risk of committing the product to repay invested capital."

It was clarified that in case a foreign enterprise should discover uranium, the amount that could be marketed must be minimal. Most radioactive minerals must be marketed directly by the proper government organizations and destined for peaceful uses within the national territory.

It has also been considered that the contracts must not "burn areas" -- that is, they must be for a specific period of time and with minimum investments and adequate sections of the national territory.

It was stated by way of example that a foreign company should invest at least \$10 million in prospecting and uranium exploration and that the area of the territory granted should not be greater than 10 percent of the total territory where uranium might exist.

Likewise, operating contracts with foreign firms must contain special clauses ensuring that Bolivia will obtain maximum control of operations and with the maximum use of human resources, infrastructure and personal services.

Production of Radioactive Minerals

This policy states that maximum indices of recovery and fine mineral content must be achieved with an optimum cost-profit ratio and maximum rationalization of production costs; the obtention of more finished products of greater added value within the nuclear fuel cycle; incorporation of radioactive mining and metallurgy into the national economy as a factor of diversification of the sector and a source of foreign exchange for the country; and the production of other materials such as radioisotopes and radionuclides for domestic consumption with surpluses for export.

The marketing policy presented by COBOEN states that we must consider the determination of periodic percentages of foreign marketing, national strategic reserves and portions for national consumption.

We must improve the national bargaining capacity by training human resources in the field of marketing and by seeking to adapt them to mechanisms of the national marketing commission and the Mining Bank.

11 464

CSO: 5100

EGYPT

ELECTRICITY MINISTER DEFENDS NUCLEAR PLANT CONSTRUCTION

Cairo AL-NHRAM in Arabic 22, 23, 24, 26 Feb 81

[Article by Riyad Tawfig and 'Abbas Mabruk: "The Winds of Fear Will Never Blow Over Egypt"]

[22 Feb 81 p 3]

[Text] The presence of a "nuclear reactor" on our country's soil has become actual fact, in spite of what has been said and discussed about every type of fear.

Eight nuclear reactors will be reaching us, and their task, specifically, will be to provide us with 40 billion kilowatts of the energy without which life would stop.

The winds of fear will assuredly never blow over Egypt. There is no room to panic over the presence of nuclear reactors.

In fact, in spite of all that, the talk about fear does not transcend a vacuum, when we realize that we are importing danger to the land of safety so that we need not surrender to our fears, which are almost keeping us destitute at a time when we need 105 billion kilowatt hours to move the elements of life over our country's territory. The national conscience demands that we discuss the illusory fears we have before turning them into facts which the scientific method, the basis of the civilizations of peoples, can no longer accept.

Following his return from a trip negotiating for the construction of nuclear reactors, I presented the top electricity official in Egypt with the fears and questions expressed by people who will be living in close proximity to the nuclear reactors, specifically the inhabitants of the city of Alexandria, on whose outskirts will be erected one of the three sites the Scientific Research [Academy] has chosen as the most appropriate construction locations for the eight plants.

The first fears presented by Mrs Durriyah 'Allubah, a women's leader in the city of Alexandria, are ones which are in the minds of almost all citizens in the city:

What are the likelihoods of danger? How broad are the safety guarantees which will dissipate fears of living in the shadow of the nuclear reactors?

The engineer and minister of electricity replied, "As regards the likelihood of danger and safety guarantees in nuclear reactors, the radioactive materials which are collected and stored in the nuclear fuel rods and the radiation they emit are the basic source of danger in the nuclear reactors. In spite of that, reactor design is fundamentally based on containing these radioactive materials and the radiation they emit under all ordinary operating conditions or even under conditions of accidents of various degrees. Nuclear reactor design differs from that of any other equipment; it is based on the philosophy of 'in-depth protection,' that is, protection against dangers before they occur. To achieve this, three degrees of security are observed:

"Protection against disruptions in the design and construction from the base, that is, designing the reactor, its equipment and the control circuits in it with maximum exploitation of the natural security characteristics of nuclear reactors while at the same time manufacturing and installing this equipment and these circuits under a strict quality system, then exerting constant surveillance and periodic testing during manufacture, erection, installation and operation to avoid disruptions in the equipment and errors on the part of individuals.

"Preventing any disruption from turning into an accident: here, it is assumed that disruptions will probably occur in the equipment or circuits or that there will probably be mistakes in operation; the reactor is accordingly supplied with safety equipment and circuits in order to protect it and its basic equipment from harm. The equipment in these safety circuits presupposes probable disruptions in them, and for this reason consideration has been given to provide them with other standby parts.

"Limiting the danger arising from accidents, if these occur: to this end, the reactor is supplied with additional security equipment to contain and retain all radioactive materials emitted as a result of accidents or to get rid of them after controlling their volumes in accordance with the relevant rules and systems so that no danger will be inflicted on the surrounding environment. To this end, we take every accident whose occurrence can be imagined into consideration, whether through influences inside or outside the reactor, including incidents of sabotage as well as natural accidents in the form of earthquakes, storms and so forth."

The minister of electricity adds, "Two things help realize complete security in nuclear reactors:

"First, natural or automatic safety characteristics of nuclear reactors which help people control them.

"Second, safety equipment which enters into the design, such as additional means of controlling the reactor in order to guarantee that man and the environment are protected from all danger, even in the event any type of accident occurs. The most important of these methods are the numerous barriers for containing radioactive materials and the numerous safety measures for operating nuclear reactors to guarantee that no danger befalls man or the environment. It is worth pointing out, in this regard, that various statistics by specialized international authorities do not mention one fatality resulting from the operating or maintenance of nuclear

plants, including the famous Three Mile Island accident in the American state of Pennsylvania. The degree of safety present in nuclear plants is considered a record."

The fears also extend to the "nuclear wastes" which are left over from the reactors and which emit radiation. The question is raised by Rear Admiral 'Izz-al-Din 'Atifi: Where will these dangerous wastes be buried?

The engineer and minister of electricity added, "As regards radioactive wastes, I would like to state that the wastes produced by nuclear plants may be divided into two groups:

"Wastes produced by operation and maintenance, which have moderate or low radiation.

"High-radiation wastes, which are the nuclear fuels that are burned and the wastes resulting from the fission of plutonium in these fuels.

"The first group does not pose a risk or technical problem. All kinds of operating and maintenance wastes are transformed from their various solid, liquid or gaseous forms to solid wastes, which are placed in tin barrels or concrete containers after being mixed with concrete or bitumen. In general, they are buried in concrete ditches which are constructed for this purpose at the nuclear plant site or in dry areas remote from habitation.

"Many people believe that all radioactive wastes are stored underground, but that is not necessary as far as operating or maintenance wastes, that is, wastes with moderate or low radiation, are concerned.

"The fuel which is burned, after being lifted from the reactor core, is stored underwater in basins for that purpose, in the nuclear plant structure for instance, for a number of years, until its temperature drops and its radioactivity declines. After that, it is moved to plants which treat the spent fuel; there the leftover uranium and plutonium are separated in order to restore their effectiveness for use as nuclear fuel. High radiation materials are left over from that, and these high radiation wastes are mixed with concrete or bitumen or fused with silicon to be transformed into something resembling glass, which is then sheathed, whatever its form might be, in a number of successive wrappers and moved to underground burial sites in stable geological formations or dropped onto the ocean floor. A nuclear plant with a capacity of 1,000 megawatts produces about 3 cubic meters of this type of waste annually.

"Since these wastes are high in radiation, they are produced where there are ways of treating the spent fuel. Developing countries, including Egypt, in which the erection of this type of installation is not permitted in order to prevent the spread of nuclear weapons, are not faced with the problem of high-radiation wastes from these spent fuels; rather, these are kept in storage in their basins for longer periods or are re-exported to nuclear fuel importing countries.

"It is worth pointing out here that the greatest source of this type of waste are reactors and plants involved in producing nuclear weapons, and we are totally uninvolved with this process, especially in Egypt, the land of peace."

The fears, as Dr Ashraf al-Naduri, professor of comparative law, says, also include the possibility that Egypt might fall into the trap of political subordination to countries exporting the nuclear fuel these reactors use, which might affect its freedom of political movement.

The engineer and minister of electricity replied, "The world market for the uranium ore used in nuclear reactors is broad to the point where the amount produced this year and last came to double the volume of world demand for it; in such conditions, where supply exceeds demand, it is natural that there are no elements of political pressure on fuel-importing countries — in fact, perhaps to the contrary, there might be an element of competition among producing countries to market the fuel in the countries importing it.

"There is another consideration which is of importance as far as Egypt is concerned, and that is that there are radioactive ore deposits in the northern Delta and the deposits of black sand in the Eastern and Western deserts, which give us great hope that the radioactive ores we require might be available locally."

What about the details of the agreement with France regarding atomic reactors?

Agreement has been reached in principle between the Egyptian and French governments to cooperate in the field of peaceful uses of nuclear energy, particularly in the realm of electricity production. A joint statement has actually been signed by the foreign ministers of the two countries in this regard, with the provision that the first fruits of joint cooperation will be to supply Egypt with two nuclear plants with a capacity of about 1,000 megawatts each with all accessories in the form of fuel and services throughout the operating life of the two plants.

The two parties also recently agreed on the preparation of political and technical agreements related to carrying out the contents of this statement, and a high-level French delegation will come to Egypt in the early part of March to discuss the drafts of these agreements preparatory to their signing by the ministers of power in both countries toward the end of March, God willing.

Why atomic reactors from France specifically?

France is a country which produces atomic reactors in abundance; its production level comes to six reactors a year. French government factories themselves are the ones which produce the reactors. Dealing with governments is safer than dealing with companies.

Before continuing the discussion on the fears, it is necessary that we find out, specifically, through calculations, what available power we have at our disposal and what we will need by 2000.

[23 Feb 81 p 3]

[Text] Has breaking into the nuclear plant field become an inevitable absolute fact to which there is no alternative in the context of the requirements of the ambitious development plan, which requires supplying 105 billion kilowatt hours per year and increasing the electricity share of each person on the country's soil from 400 to 1,600 kilowatt hours per year to help forge a civilized society which is expected to reach 65 million in size with the dawning of the year 2000?

The growing question which is now being repeated on every tongue is prompted by the volume of our tremendous resources, especially sources for generating electricity on the long extensive river, the oil, coal and natural gas with which the depths of the good earth are abundant, and then the contribution which our efforts to make new sources of energy can offer through the tremendous drop at the Qattarah Depression! How is it possible that all these resources will not make the realization of our ambitious energy requirements possible?

The conversation is still going on with the top power official in our country, Eng Mahir Abazah, the minister of electricity; the broad query is, What is the energy storehouses, and what is now available in our country?

Eng Mahir Abazah, the minister of electricity, replied:

"If the question is about the extent of Egypt's need for nuclear plants to generate electricity, in the context of other power sources available, I would like to begin by asserting a fact which has been confirmed and well-established, following all the studies which have been produced on expected electricity consumption development in the coming years up to 2000. This is an actual fact over which there must be no dispute, namely, that breaking into the field of nuclear plants in order to generate electricity is an absolutely inevitable development for which there will be no alternative if we want the ambitious development plan to avoid all obstacles. It is the plan on which all our hopes for progress and welfare coincide, since without dispute electric power represents the backbone and motive of this plan.

"Before we talk about the inevitable justifications for using nuclear reactors as a source for generating electric power, we must review the other electric power sources which are available to us.

"In this regard it is necessary to first mention the most important natural sources we have, which is the Nile River. Most of this was actually put to use following the erection and startup of the two plants on the Aswan reservoir and the High Dam, and a study is now underway on using the remaining portion of this important, cheap source by constructing a second Aswan electric generating plant with a capacity of 270 megawatts, as well as electrification of the Isna and Naj' Hammadi barrages, which is now being studied preparatory to construction.

"After the Nile River, we have only one hydraulic power source left, and that is the project to generate electricity from the Qattarah Depression, a tremendous depression covering one fifteenth of the area of the republic. Mediterranean water

will be brought to this depression, and I say that use of the great drop which will then be provided will be a great source of additional power, since this project will provide 50 billion kilowatt hours in just the first 10 years of operation saving an estimated quantity of about 15 million tons of heavy fuel oil costing about \$3 billion for power produced from thermal generating stations using heavy fuel oil.

"There also are other hydraulic power projects, pumping and storage projects along the al-Jalalah mountain range along the Red Sea coast and others. The full exploitation of hydraulic power sources in Egypt will realize a total of just 15 billion kilowatt hours a year for us, and I can just say that I am facing another terrible figure, representing Egypt's needs for electric power in 2000; that figure is about 1.5 billion kilowatt hours a year [sic]."

What about oil?

The minister of electricity added, "The main traditional available source is oil. If we imagine that we will generate the rest of the nuclear power we required in 2000, which will total about 85 billion kilowatt hours per year, I state that if we imagine that we rely on oil alone for that by using thermal plants operating on oil products, that will mean that we will need to consume more than 22 million tons of oil a year in 2000, or very close to Egypt's current oil production, the cost of which, in current prices, will come to more than \$3 billion a year. This is a figure on whose basis we cannot plan under any circumstances, without falling prey to a grievous error, since we will be exposing the development plan to danger while we expand electric power as a basis for serving this very plan. It is very important to state that every nuclear plant added to the united grid will result in savings of oil consumed for electricity generation, and that will make it possible to devote the oil to export on the one hand and to use in petrochemical manufacture on the other."

Natural gas and coal also exist in our country's territory.

In the event we use natural gas to help meet our electric power generating needs, that also will mean that we will need 65 million cubic meters of it a day while the production currently available, as the minister of electricity added, is about 22 million cubic meters a day — 75 percent of which is allocated to manufacturing fertilizer, iron and steel and to household consumption. Industrial and household uses of natural gas are considered to be the best economic use, while using gas to produce electricity is considered a blatant natural loss.

If our thoughts are directed to having coal contribute its part to generating the electric power required, current estimates of the coal reserves present in Sinai are about 35 million tons. Since it is well known that a 600-megawatt electric generating plant operating on coal consumes about 2 million tons of coal a year, that means that all the coal reserves we possess will be sufficient to operate a plant of that capacity for just 20 years, and this will represent only 4 percent of our total electricity requirements in 2000.

There is a scientific fact the minister of electricity declares in this regard, describing the effects of burning quantities of coal in a plant with a 600-megawatt capacity which releases approximately 6 million tons of carbon dioxide, about

36,000 tons of ammonia and close to 20,000 tons of soot into the atmosphere annually, as well as carbon monoxide and other byproducts of combustion, which all represent an environmental pollution whose effects extend to surrounding agricultural and population areas; all this will entail added costs to prevent this pollution.

What about our country's brilliant sun?

Solar energy use cannot go beyond water or space heating requirements. Electricity from the sun is still in its initial stages of research and one cannot now consider the sun a source of electric power.

How have our electricity requirements been calculated?

The per capita share in our country does not exceed 400 kilowatt hours a year, whereas the figure comes to more than 10,000 kilowatt hours per year in advanced countries. In fact, in Israel the individual obtains 3,000 kilowatts a year. The Ministry of Electricity, as Eng Mahir Abazah added has cooperated with some foreign consulting firms specializing in the field of electricity, and in addition there is the study performed by the joint work groups of American Energy Department and Egyptian experts. The studies are unanimous in setting a figure of 105 billion kilowatt hours as Egypt's annual electricity requirements according to the economic and social development plan. The goal is to have the average per capita share of electricity rise to 1,600 kilowatt hours per year at a time when it is expected that the population in Egypt will reach 65 million by 2000.

What do the economics of operating nuclear plants indicate?

The minister of electricity replied,

"The cost of operating a 600-megawatt electric plant differs greatly according to differences in price in the use of heavy fuel oil or nuclear power. That may be attributed to the fact that the price of nuclear power that can be extracted from natural uranium is lower than that of natural fuel and that the volume and weight of the nuclear fuel is low in comparison with the power it generates, which reduces transportation costs. In addition there is the low waste from nuclear energy; after 3 years of continuous operation the waste from a 1,000-megawatt electric plant will weigh just 3 tons; even in the event the world prices of fuel rise, that will still favor the economics of nuclear plants. In the event prices rise by 50 percent, the increase in the price per kilowatt hour produced from nuclear plants will be 3.5 millimes while the increase in the price of producing that electricity from plants operating on heavy fuel oil will be about 12.6 millimes. While heavy fuel oil prices are rising constantly, the price of uranium ore became stabilized at \$43.50 per pound in 1978 and the first half of 1979; then the price dropped, and now totals \$41 a pound. All computations confirm that the cost savings in producing energy generated in 600-megawatt nuclear plants, whose productive capacity totals 3.6 billion kilowatt hours a year, are estimated at about \$95 million a year on the basis of current fuel prices, and these savings increase the more the oil price rises.

"There is also encouraging evidence that nuclear fuel ores are abundant in Egypt, since the presence of sediments bearing nuclear ores has been proved in the northern

Delta, the black sand deposits in the Eastern and Western Deserts. The reserves which have been confirmed in the black sand deposits total:

"21,000 tons of uranium.

"295,000 tons of thorium.

"8.5 million tons of zirconium.

"As for phosphatic rocks, the uranium determined to be present in the form of uranium oxide comes to more than 100,000 tons. This all confirms the presence of the domestic ore required for the nuclear program in Egypt. For this reason, by all criteria, nuclear plants are considered to be economically the best sources for producing energy."

Regarding the extent to which countries are now willing to handle nuclear reactors, the minister of electricity replied, "While Egypt has decided to erect eight nuclear reactors under its nuclear program for the coming years, the figures show that all the nuclear plants in the world now total 258, operating in the service of 23 countries and producing 149,777 megawatts of electricity. Another 191 plants are still under construction in various countries on the world map."

[24 Feb 81 p 37]

[Text] There is a permanent fact scientists talk about which studies confirm and figures support.

That fact is that nuclear power is the assured, practical alternative for providing our electric power requirements and enabling us to reduce dependence on oil and natural gas as much as possible.

While there are people who fear a lack of safety, the scientific answer is that there are eight safety considerations in the construction of any nuclear reactor anywhere in the world and they are all satisfied in Sidi Karir. Perhaps the most important of these is that no solid, liquid or gaseous radioactive wastes are to be emitted into the outside environment by the nuclear plant during its operation. The Egyptian plant is designed to guarantee that no radioactive materials leak out even in the event of operating accidents. This view has been confirmed by the International Atomic Energy Agency, in the words of head of its Nuclear Power Section, who said in his report "Sidi Karir is to be considered the best of sites in comparison with the ones which people have been assigned to evaluate in various countries of the world since 1963, which are 108 in number."

While there are people who say that the nuclear plant is close to Alexandria, which is heavily populated, the answer is that the area of Chicago, for example, which is the second largest city in America in terms of population, has six big nuclear plants, all along Lake Michigan, which is considered a source of drinking water for the city.

If we change the site now, we will lose 4 years in the life of the Egyptian atomic program, and along with that will have material losses, in terms of figures, of 1.99 billion pounds.

Let us review the matter in detail, so that we can see what scientists' views concerning it are:

It is well known that the average per capital share of energy in Egypt now comes to about 400 kilowatt hours per year. This rate is considered to be among the lowest for electricity consumption in the poor developing countries. According to the economic and social development plan, the objective is to raise the per capita share to 1,600 kilowatt hours per year. If the volume of requirements is compared with the volume of the units currently installed, whose capacity comes to 4,700 megawatts of electricity, we will find that we will need to add electric units with a total capacity of 17,960 megawatts to the Egyptian system in the next 20 years.

Oil and Natural Gas

If we rely on oil and natural gas to meet our remaining electric power requirements, that will mean a demand for the equivalent of about 22 million tons of heavy fuel oil a year, costing about \$3,115,000,000 on the basis of a crude oil cost of \$20 a barrel. If we use natural gas, that will mean a demand for 65 million cubic meters of gas per day, whereas our current production is about 22 million cubic meters a day. Current predictions indicate that our gas output will never go beyond 35 million cubic meters a day, 75 percent of which goes to the fertilizer industry and household consumption — both of which represent the optimum economic use of natural gas, while burning it to produce electricity is considered a gross national loss from the standpoint of science and economics.

Therefore one can say that nuclear power is the assured, practical alternative for providing Egypt's electric power needs so that we can reduce dependence on oil and natural gas as much as possible. Here we must point out that the existence of uranium ore, which is used as fuel in nuclear reactors, has been confirmed in encouraging amounts in a number of forms in these Egyptian locations.

Why Sidi Karir?

We now come to an important question, which is what reasons are given for preferring Sidi Karir over other places as the site for the first nuclear plant in Egypt?

The answer, in the words of Dr Muhammad Fu'ad al-Fuli, vice chairman of the Nuclear Plant Authority, is:

"There are a number of reasons, most important of which are eight safety considerations: there are no active geological faults in the area, the winds change direction throughout the year and have a high dispersal rate, both of which characteristics are very suitable from the standpoint of radioactivity; earthquake activity is slight and the earthquake history of the region has not recorded any violent quakes; the groundwater level and flow are suitable; it is a marine area endowed with clean water and the rates of change in the wave level is moderate throughout the year; the area is not exposed to natural phenomena or dangerous catastrophes like storms, hurricanes or tempests; its site is very suitable by all international criteria since the location is bordered by the ocean to the north and salt flats

to the south and the area set aside is 5 [square] kilometers and constitutes a restricted area which more than meets all the rules and principles in various countries; finally, big installations in the area are suitably remote in terms of their effect on the plant — roads and railways are sufficiently distant, according to international regulations.

"There also are engineering considerations which are concentrated in the presence of the necessary cooling water for the plant, since the elevations of the area and the nature and depth of the ocean floor are suitable for the construction of a cooling water inlet and outlet. There are also a number of suitable springs for providing fresh water for both construction and for operation. The nature of the soil is also suitable for bearing heavy loads.

"There also are electrical considerations, among them the fact that the site is close to the unified Egyptian grid, facilitating the hookup of the plant and guaranteeing a secure source of electricity as well as ease in supplying the area with electricity."

All of these reasons, as Dr 'Ali Fahmi, head of the study and projects section in the Nuclear Plant Authority, says, make Sidi Karir preferable as a site for the construction of the first nuclear plant. To that one should add that the International Atomic Energy Agency sent two of its experts who specialized in sites, the acting chief of the Nuclear Safety Department and a member of the Environmental Safety Section in it, to make an evaluation of the studies made so far on the Sidi Karir site, evaluate them, discuss with various bodies, and visit the site in its natural state. The international agency issued a report stating that the Sidi Karir site was the best in comparison with the sites the agency had evaluated in various countries in the world since 1963, which total 108.

Safety and the Reactor Core

After that, there is the atomic reactor and the safety features in it. What about them?

As Dr al-Fuli says, the probabilities of risk to the security of the site and the environment are concentrated in the reactor core, which holds the nuclear fuel, which is located in a pressure vessel; the probabilities of danger come from the possibility of a leakage of nuclear fuel radiation out of the reactor building and into the site and environment surrounding the nuclear plant if a major accident occurs. This has been taken into account in the design of the atomic reactor building. In addition to the different safety systems and the numerous safety characteristics, the applied safety characteristics, and the engineering safety systems, there are successive barriers to stop the radiation from reaching the people working in the nuclear plant, the population and the environment surrounding it as well.

The first of these barriers are the water inside the pressure vessel which contains the nuclear fuel, the pressure vessel itself, then, after that, the anti-radiation shields which surround the pressure vessel, which are of thick concrete. In the event the radiation leaks through all these barriers, as the consequence of a

major accident, there is, following that, an exterior containment vessel composed of two containers, the inner one of iron, the outer one of concrete, which make up the exterior building of the reactor and have no function except to contain radiation which might leak out of the reactor interior in the event of a major accident, preventing any effect on the safety of the site and the environment.

One can say, as Dr 'Isnat Hasan, head of the construction section in the authority, states, that the technical specifications of the Sidi Karir nuclear plant will meet maximum radiation safety conditions as far as man and the environment go. No radioactive wastes — solid, liquid or gaseous -- go out of the plant into the external environment during ordinary operation, and the plant is also designed to guarantee that no radioactive materials leak out in the event of operating accidents exposing the surrounding environment to more than the internationally permitted level.

As for pollution in the city of Alexandria, for instance, no water pollution is produced by nuclear plants, among them the one in Egypt, except for a slight rise in the temperature of the water at the cooling water outlet. This occurs in the case of traditional thermal plants; in fact, nuclear plants are distinguished from conventional thermal plants in that they do not produce carbon oxides which lead to pollution of the air and the environment. Here we can give the example of the area of Chicago, where there are six big nuclear plants on Lake Michigan: one should bear in mind that the lake is the source of drinking water for the city, which is the second largest in America, as well as for four states on the same lake. More than that, deliberate error and sabotage are taken into consideration in the natural protection systems as well.

There Is No Ready Alternative Site

A question might be raised: Is there an alternative site to Sidi Karir readily available for construction of an Egyptian nuclear plant?

As Dr 'Ali Fahmi says, the studies which have been made since 1963 have shown that Sidi Kariri is the most suitable location for construction of Egypt's first nuclear power plant. The detailed studies on the sites which have been examined for future nuclear plants since 1977 have not yet been finished. Preliminary studies consider the al-Dab'ah site 160 kilometers west of Alexandria to be the next best one to Sidi Karir in terms of suitability and fitness. However, more important than all that, there will be negative effects on the execution of the Egyptian nuclear program and the economics of the project itself, if construction of Egypt's nuclear program is delayed.

The first negative feature, as Dr al-Fuli says, has been the delay up to 4 years in construction of the first nuclear plant so that detailed studies could be made on the new site and the resulting delay in the Ministry of Electricity's plan to produce electricity and the necessary replacement of other sources which are less economic than nuclear plants.

A loss in the money already spent on studies, research and the special development of the Sidi Karir site, estimated at 4 million pounds, and a loss of the great scientific and technical effort exerted over the past 16 years.

An increase of about 8 percent a year over current prices in costs of construction and importing the equipment and raw materials for the nuclear plan because of the escalation in world prices; this increase is estimated at about \$80 million.

A loss of a quarter of a million Egyptian pounds per kilometer which will be incurred in the event a site is chosen farther west, as well as an increased cost of construction, transportation and facilities; this will have a negative effect on the economics of the project.

Complications in the situation bearing on the execution of the nuclear fuel enrichment agreement concluded with the American government; the enrichment processes were linked to a specific date, in accordance with the program set forth for construction of the plant at the Sidi Karir site. One should bear in mind that the Ministry of Electricity has delayed matters connected to the agreement 4 years so far.

If we want to underline the magnitude of the loss in the language of numbers, the figures show in the event thought is given to delaying the execution of Egypt's nuclear program, the losses from a delay of 4 years will be:

1.44 billion pounds in the costs of lost electricity production.

20 million pounds in the cost of the site study.

70 million pounds in increased costs for the network in the al-Dab'ah area.

440 million pounds in increased costs for the construction of the plant.

20 million pounds for the freshwater plant.

30 million pounds for the port to offload imports.

10 million pounds in power lost because of the remoteness of the load center.

That is, Egypt will lose 1.99 billion pounds in the event of a delay.

Where Will the Eight Reactors Be Erected?

Copious studies have been made in the quest for sites along the northwestern, Red Sea and Gulf of Suez coasts fit for the establishment of nuclear plants. It is apparent from these studies that the Red Sea coast will not be suitable for geological reasons, while there are a number of sites suitable for this purpose along the northeastern and Gulf of Suez coasts — specifically, as the minister of electricity says, at al-Dab'ah, 170 kilometers east of Alexandria, al-Za'faranah, 150 kilometers south of Suez, and Sidi Karir 30 kilometers west of Alexandria.

There are international standards for the method for selecting these sites which have been agreed upon and enter into matters related to all electricity plants in general, such as their linkup to the unified electricity grid, the availability of load centers around them, the availability of an adequate source of cooling water and other purely technical considerations.

from the standpoint of their nature as nuclear plants, the standards stipulate site conditions which are related to the geological formation, the groundwater, wind directions and other atmospheric phenomena, population density distribution, and all environmental and security aspects. I would like to stress that we in Egypt have taken care to apply the most stringent conditions followed in the various countries of the world as recommended by the International Atomic Energy Agency in Vienna.

[26 Feb 81 p 3]

[Text]

While Egypt's nuclear program up to 2000 includes the construction of eight nuclear plants providing 6,000 megawatts of electric power, the most up to date map set out by Egypt's scientists at the disposal of officials on atomic ores -- the source of the nuclear fuel for these plants -- shows that Egypt has sufficient uranium reserves to produce the atomic fuel to cover Egypt's nuclear program. More explicitly, all nuclear fuel will come from Egyptian soil.

On the nuclear map of Egypt are facts and figures which show that there now are, to start with, three mines in the Eastern Desert which can give us 5,000 tons of uranium of nuclear quality as fuel for the reactors.

There are also seven locations in the southern Eastern Desert where uranium ore has been discovered, in addition to five sites in the Western Desert and three areas around Rashid and Dumyat in the Nile Valley itself where atomic ores have been discovered from which uranium and thorium, the second fuel for reactors, can be obtained, as well as the coating material for the nuclear fuel rods. Another site which has been added to Egypt's map is the Jabal Hudi location near Aswan, which represents the most recent atomic ore discovery Egyptian scientists have made.

Before going into details on the nuclear map of Egypt and the figures involved in it, there are a number of facts we must record, firstly:

Thirty years [sic] of effort lie behind the preparation of Egypt's nuclear map; it is an effort which started in 1960 with Egypt's entry into the atomic age and construction of the Inshas nuclear reactor.

Unknown heroes numbered in the dozens of geologists and hundreds of workers and technicians have made more than 160 trips over every square inch of Egyptian territory. All the concentration has been on the Egyptian desert, where there are rock formations in whose depths veins of atomic ore may lie hidden.

The Egyptian air force has made an aerial survey of one quarter of Egyptian territory which Egyptian scholars had previously set forth and it has used radiation survey equipment to determine the probable sites of the atomic ores.

Let us now attempt to become acquainted with Egypt's atomic map through the Egyptian scholar al-Shadhili Muhammad al-Shadhili, chairman of the Nuclear Materials Authority and an Egyptian scholar who has truly worked on Egypt's behalf.

Uranium and Egypt's Nuclear Program

As Dr al-Shadhili says, "The current plan for entering into reactor fuel production is aimed at producing a minimum of 20 and a maximum of 50 tons in the first stage. In the second stage, uranium production will increase to 100 tons a year up to 1990, when total production then will reach 700 tons. A review will be made of the plan by 1990 to increase and diversify the annual rate of production in the light of variables and requirements in the energy situation in Egypt for 2000, in accordance with two alternatives, the first of which will represent a minimum, which is to increase uranium output at a rate of 100 tons per year, while the second, representing the maximum, is to increase production by a rate of 200 tons a year.

Uranium and Uranium Sites in Egypt

"This brings us to a discussion of sites in the Nile River Delta. Conclusions of studies by geological expeditions have confirmed that such nuclear ores as monazite and zircon are deposited in the north of the delta of the Nile River and extend in varying proportions along the coast, from Abu Qir in the west to Port Said in the east. There are three sites, specifically, east and west of Rashid and east of Dumyat." The Egyptian scientist also says that monazite ore contains uranium, thorium and some rare earth elements and that it is possible to extract uranium as a byproduct of monazite processing.

Scientists have estimated the reserves of thorium ore in the top most meter of the deposits at three sites at more than 14,000 tons; the reserves of uranium ore in the top most meter total more than 1,000 tons. Additional thorium reserves in the other 19 meters of the ore-bearing stratum are estimated at about 280,000 tons and uranium reserves are estimated at about 20,000 tons.

Scientists have discovered zircon ore associated with the monazite; this is used in producing an alloy which enters into the coating of nuclear fuel rods.

Egypt's scientists have succeeded in separating thorium and uranium from monazite ore in a semi-processed context. An industrial unit with a capacity of 200 tons a day is now being readied to separate the metals, after which units will be built to separate thorium and rare earth elements and extract uranium as a byproduct.

The second area on the atomic map of Egypt is the northern Eastern Desert. The geological studies which have been carried out in the Wadi 'Arabah, al-Jalalah coastal heights and the al-Jalalah inland heights have resulted in the discovery of two types of uranium ore. South of Wadi 'Arabah, Egyptian scientists have come upon two new sites of deposits bearing uranium and thorium.

10,000 Meters of Tunnels

In the southern Eastern Desert, where much of Egypt's hope lies, a number of deposits of nuclear materials have been discovered which one could in general categorize as being of two types: first, uranium deposits, and second, complex uranium and thorium deposits along with some rare elements. As Dr al-Shadhili says, the uranium deposits, as geological investigation has shown, are spread out over a number of sites in the southern Eastern Desert and are generally present in the

form of veins or blocs. The reserves of these deposits are estimated at about 5,000 tons of uranium. In 1979 a contract was signed with the High Dam Civil Works Company to excavate a pilot tunnel 10,000 meters long in three mines in the al-'Uwaydah, Rub' al-Jarrah and al-Sikat areas. A contract has also been signed with a Canadian company to design a mobile processing unit to produce uranium from uranium ore at a rate of up to 50 tons a year, now that scientific experiments to extract nuclear grade uranium from the ore in the three mines have succeeded. The next step, as the Egyptian scientist says, is to produce uranium from simple uranium ore as a precious metal and to refine this metal up to nuclear grade, on grounds that precious nuclear-grade metal can be put to all types of uranium use.

The important thing is that Egypt's scientists have discovered complex deposits in seven sites in the southern Eastern Desert, where there is uranium and thorium along with some rare elements like niobium and tantalum, which are used for making certain nuclear alloys. In the same area scientists have come upon deposits of beryllium, which ancient Egyptians found in their search for noble stones such as emeralds.

In the area of the southern Western Desert, geological expeditions have come upon deposits containing uranium and thorium in the Danjal Oasis. The expeditions have also found strata of zircon containing uranium ore in Jabal al-'Uwaynat. Geological investigation has also made a preliminary discovery of various uranium and thorium sites near Jabal Abu Ballas near the al-Dakhilah oases, at Jabal Abu Bayan, at Nassab al-Baljum, and at Bir Safsaf south of the al-Kharijah oases. These are important indications of the massive resources the southern Western Desert contains in the field of uranium ore and other nuclear materials.

11887

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EGYPT

STATUS OF NUCLEAR FUEL PROSPECTING, MINING INDUSTRY REVIEWED

Cairo AL-AHWAM AL-IQTISADI in Arabic 9 Feb 81 pp 16-18

[Article by Dr Mamduh 'Abd-al-Ghaffur Hasan: "What Is Going on in the Nuclear Materials Authority?"]

[Text] The problem I would like to raise concerns the Nuclear Materials Authority, for whose establishment a republican decree was issued in 1977. It was not a new structure which was to be established but a situation that was to be changed; this authority was established as a continuation and expansion of the Geology and Atomic Ores Section of the Atomic Energy Authority, which commenced its existence in 1956. This section was expected to expand and concentrate its activities when the importance of nuclear fuel became apparent; it was decided to covert it from a section in an authority to an independent authority in its own right. People working in the section became employees of the authority, their numbers increased and the head of the section (as of 1962) became an authority head. That is, he remained head of this structure — the section, then the authority — for 18 years.

The basic duty of the former Geology and Atomic Ores Section and present Nuclear Materials Authority is to develop nuclear materials, of which the most important is uranium, in Egypt. It has become evident, in the local and international contexts, that nuclear energy will play an important role among the various sources of energy in the near future, and uranium is the fuel for that energy. Egypt has begun to enter the field of generating electricity from nuclear power with a plan aimed at giving us several nuclear plants by 2000 with a total capacity of 6,000 megawatts. However, the Ministry of Electricity and Power, on the one hand, and the National Production and Economic Affairs Council, on the other, have stressed that this plan will rely completely on imports of nuclear fuel from abroad until Egypt is able to develop its resources of this fuel. So far there is no plan to produce uranium from local ores in Egypt and in fact there is not yet any accurate estimate of the uranium reserves in Egypt.

Here is where the problem of the Nuclear Materials Authority lies. It has not yet offered Egypt's nuclear future anything tangible, nuclear fuel, some nuclear fuel, or even an accurate appraisal of Egypt's resources in the field. In fact, the authority does not have a clear plan by which to proceed in facing the challenges of the future.

The republican decree establishing the authority specified the formation of its board of directors, stipulated that that is the supreme power in the authority,

and stipulated that it must meet at least once every 2 months. However, the board has met only twice, in July and August 1978, since the establishment of the authority. On these two occasions, the meeting was based on an invitation from the minister of electricity and power at that time, to whom the authority was subordinate. His call for the two meetings was the result of an insistence on the part of the leaders in the authority on solving its problems. Although some important organizational decisions were taken at these two meetings, the decisions themselves were not carried out but remained mere ink on paper. The board of directors has not met since that time.

The board of directors also decided to assign the vice chairman of the authority (an expert in the geology of nuclear ores with the International Atomic Energy Agency) to supervise the two research and exploration sections and to have the powers and specialized activities of the authority chairman with respect to these two sections. When a clash of views arose on a situation in the exploration section, a decree was issued withdrawing the authorities and powers of the vice chairman of the authority, and the second man in the authority was left without work or power. One should bear in mind that he was one of the persons with the most long-standing experience in nuclear materials in Egypt. He is currently in the Cameroons, appraising some nuclear ores on an assignment from the International Atomic Energy Agency which will last for 6 months.

Among the decrees of the board of directors was one governing the formation of a council of directors under the chairmanship of the head of the authority, with the vice chairman and section heads as members. This council would be concerned with running day-to-day activity in the authority. However, this council has not engaged in its areas of specialization either and has not yet held one meeting.

The decree establishing the authority also stipulated that it was to be broken down into four technical sections, one each for exploration, production, research, and contracts, and that four of the most senior employees of the authority were to be appointed to head them. In addition, there would be a financial and administrative affairs section, which one of the senior administrators in the Ministry of Electricity would head. However, they began to suffer unfair treatment shortly after establishment of the authority. The heads of the production section, then the head of the exploration section, were isolated, following elimination of the powers of the vice chairman of the authority, and these two positions were left vacant. A freeze in the research and contracts sections followed.

The chairman of the authority issued decrees establishing a large number of scientific departments, and scientists were appointed to head them, but their powers became limited. In the absence of section heads, the department heads proceeded to engage in direct dealings with the chairman of the authority and daily activity in the authority was devoid of planning, coordination or cooperation among the various departments; most of the activity which took place continued to consist of individual efforts in the form of scientific papers or research.

In the elections which took place recently in the authority to choose a union committee for the people working in it, tremendous effort was made to persuade the greatest possible number of employees — especially ones working in geological expeditions in remote areas — to send in votes to choose specific individuals.

These efforts led to the election of a trade union committee working to create a popular labor base to confront the scientists who were demanding reform and to widen the gap among them. The first act of this trade union committee was to send the Ministry of Industry a memorandum attacking the scientific authority heads, describing them as "a few deviationists."

This description of some of the internal conditions in the authority has been necessary to show the situation it faces, which has made it incapable of continuing the mission assigned to it. In terms of exploration, the aerial reconnaissance airplane has not made one exploratory flight since 1977. In terms of production, the most serious work the authority has carried out has been the pilot tunnel project in the Eastern Desert, which will cost 2.39 million Egyptian pounds over 2 years (from January 1980 to January 1982), in addition to the attached mobile plant, which will cost 4 million pounds. It would require another article to comment on this; it is sufficient for us to realize that this project was carried out without any prior feasibility study, and it is sufficient for us to realize that the cost of a kilogram of uranium oxide, produced by this project will be more than four times the world price (assuming the validity of the press statements on the volume of ore discovered and the volume of production expected). The research section is the only section which has a chairman located in Cairo, but he is totally divorced from all resources and powers and does not know what is going on in the plants under him. The contracts and agreements section has not engaged in any activity since its establishment because all contracts and agreements are made without its participation; no measures have even been taken on the authority's reports and documents, which were supposed to have been authenticated.

Shortly after the establishment of the authority, the most senior employees in it called attention to the fate toward which it was rapidly heading. They rushed to the authority chairman to consult and put matters in their place. When these efforts did not succeed, the problem was presented to higher authorities. It was then that the minister of electricity and power summoned the board of directors twice but the cabinet change did not give his excellency the time to adopt real measures related to reform. However, the following minister of electricity rapidly understood the problem, clearly perceived the condition of the authority and pointed out that a radical solution was inevitable.

However, execution was delayed and the patience of some people working in the authority ran out. They took the whole case to the Administrative Surveillance Agency, whose investigators started looking into conditions in the authority with great amazement. However, suddenly, without preliminary signs, the authority was transferred from the Ministry of Electricity and Power to the Ministry of Industry. We ought to have started the next road with the former minister of industry and mineral resources, who did not have enough time to get a feel for the authority's problems from close at hand so that he could ease the problem a little. Following the formation of the new cabinet, we have high hopes that the hand of the minister of industry and mineral resources will hasten to move the wheels of activity forward in the biggest nuclear scientific authority in Egypt, with God's will and backing.

The Nuclear Materials Authority is going through professional problems, and the condition in this authority has come to need reform. For more than 3 years, I with some of my colleagues, who were the first people to join the authority and set out its foundation stones, have been trying to carry out this reform; we have followed many roads in which circumstances have conspired to obstruct our efforts. Perhaps that was bad luck. It has occurred to me that we should pursue the road of the Fourth Estate; perhaps bringing this problem into the context of the media will highlight its gravity and hasten its solution. I have assigned myself to take this initiative to present the problem in brief, so that it may attract attention.

11887

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PROSPECTS FOR ACQUISITION OF NUCLEAR POWER PLANTS FROM U.S.

Tel Aviv MA'ARIV in Hebrew 12 Dec 80 p 17

[Article by Avraham Peleg: "Israel's Ability to Build Nuclear Power Plants"]

[Text] The decisions taken at the 5741 Conference of Nuclear Associations which was held several days ago at Ben Gurion University in Be'er Sheva call upon the government once again to construct nuclear power plants in Israel. The speakers from among the 300 nuclear scientists and engineers who participated in the conference contended that if the manufacturers of the power plants place obstacles in Israel's path, we have sufficient know-how and technical resources to build nuclear power plants independently.

The scientists and engineers repeatedly put pressure concerning this issue on Minister of Energy and Infrastructure Mr Yitzhak Moda'i who took an active part in the debate. The minister announced that he had tasked a committee of experts headed by the president of the Technion, Mr Amos Horev, with studying the matter for the purpose of beginning the construction of the plant during this decade. The Horev Committee will submit its conclusions in April 1981. Moreover, another committee is already engaged in the search for suitable locations for the construction of nuclear plants in Israel.

Reagan Era Likely to Help

"In the area of nuclear energy," contended the president of the Israeli Association for Nuclear Sciences, Prof Shimon Yiftah, "We have lost one and perhaps two decades —let us not lose the third one! I believe that in this decade we will begin the construction of a nuclear power plant."

These comments were reinforced from the other side of the Atlantic Ocean. Several weeks ago a nuclear energy conference was held in Washington, and American experts predicted that the period of the "nuclear freeze" imposed by President Carter has ended. The new president, Reagan, will bring with him drastic changes in the American policy, they contend, and not only regarding the construction of plants in the United States but also their sale to other countries.

If these "nuclear predictions" materialize, it can be assumed that it will have a major effect on the future of nuclear development in Israel after a long period of struggling here with the questions of "should we" and "how many."

Twenty Years of Decision Making

In January, 1961, a committee of physicists, engineers, economists, and representatives of the Atomic Energy Commission and the Electric Company was established in Israel for the purpose of studying the technological and economic conditions for constructing a nuclear power plant in Israel. A year later in 1962, the committee headed by Prof Shimon Yiftah submitted a report which included recommendations for assuring and securing locations for nuclear power plants to be constructed in the future and for basing the planning for the supply of power on the largest possible nuclear production units which would be integrated into the general power production network in Israel.

In 1963 Israel's nuclear plans received additional acceleration as a result of an American assurance of aid in the construction of a dual-purpose nuclear plant (for the production of power and the desalination of seawater) in Israel. A year later these assurances were given an official seal of approval in an agreement between the then prime minister of Israel, Levi Eshkol, and the then President of the United States, Lyndon Johnson, for a joint study of a plan for a dual-purpose plant.

In fact, the two governments funded a study which recommended, among other things, the construction of a 200 megawatt power plant. The Eshkol-Johnson agreements at that time constituted a "hot issue" in Israel, however the project proceeded to "cool down." Even in 1968 when a committee, with a similar composition to that of the one of 1961, reexamined the worthwhileness of constructing a nuclear plant in Israel, the major project did not progress.

Nevertheless, the plan was not removed from the agenda, and in virtually every year, some decision which called for its implementation was made. The winter of 1972-1973 was a very warm one, and the concern about the depletion of the water reservoirs of the country again whetted the interest in the nuclear option.

In May 1973 a ministerial committee decided upon the actual preparations for the construction of the first nuclear power plant in Israel. Its activation was scheduled for the early 1980's, however the nuclear project again became stalled.

Carter's "Evaluation"

It returned to Israel's national agenda after the Yom Kippur War and the world energy crisis. In April 1975 the government approved in principle the construction of a nuclear plant which would be operational in 1983-84. Three plant manufacturers, Westinghouse, General Electric, and Babcock-Wilcox, submitted proposals for the construction of the plant.

A year later it was decided to build two plants, each one with a capacity of 900 megawatts. The American company Westinghouse was selected as the builder of the plants. According to the plan, construction of the first plant was to have begun in 1977 in Nizanim with the construction of the second plant scheduled to begin 1 and one-half years later.

The Electric Company predicts that the demand for power in 1986 will reach about 3,500 megawatts, and in that year the first nuclear power plant was scheduled to begin to generate power (the construction time for a nuclear plant is from 8 to 10 years).

Israel's nuclear plan, however, again ran aground in the form of President Carter's nuclear policy, the abbreviation of which was INFCE (International Fuel Cycle Evaluation). Behind this "evaluation" was hidden the firm decision of the President of the United States to block the spread of nuclear materials likely to increase the reservoir of nuclear weapons.

The Three Options of Yiftah

During the period of Carter's presidency, the Americans suspended the technology for the fission of plutonium. Moreover, the Americans stopped the development of the "breeders," the rapid reactors, because these reactors produce in their operation more plutonium than they need for the purpose of their operation. The rapid reactors are considered the ones of the future, and the stoppage of their development in the United States was a heavy blow to all of the advanced nuclear research and development.

In the last 4 years the American administration imposed strict limitations on the export of reactors and nuclear technology and actually severely limited construction of nuclear power plants in the United States itself. In the last 4 "nuclear lean years" not even one country purchased reactors in the United States, and in the opinion of experts it stopped serving as the leader in nuclear technology. France, Germany, and other countries took its place in providing power plants.

And so it happened that when Israel had decided to take practical steps for the construction of nuclear plants through reliance on American technology, Carter's "nuclear doctrine" which prevented such progress was dominant. To this must be added the reluctance which has always prevailed in the United States to introduce nuclear technology into the complex Middle East. Israeli experts now are pinning great hopes on the "new winds" which are blowing from Washington with the entry of Reagan into the White House and anticipate that the INFCE policy will no longer stand as an obstacle in the nuclear powerization of Israel.

"We must endeavor to fully use this option," says the president of the Israeli Association for Nuclear Sciences, Prof Shimon Yiftah, "in that the first steps to acquire nuclear technology from the United States have already been taken. During the Carter period this option was in doubt, and it seems that today with the change of administrations, everything has been reopened."

Prof Shimon Yiftah proposes at the same time that there be no waiting for the American option but rather a substantive and serious consideration of other options. The reference is to those countries who have already sold and who are also selling today nuclear power plants in accordance with the accepted principles of the International Atomic Energy Agency. Countries such as Germany, France, Canada, and even Japan appear to Prof Yiftah as possible suppliers. These countries have sold power plants to Iran, South America [sic, possibly "South Africa" intended], Brazil, Korea, Argentina, India, Pakistan, and others.

Prof Yiftah sees a third alternative: self-production of plants with foreign assistance. The nuclear scientist points out that even during the course of the contact with the American companies a target was set that Israel itself would provide components constituting 60 percent of the overall cost of the first nuclear power plants and that in the subsequent plants this percentage of components, including nuclear fuel, would increase. It is evident from this that Israel has at least a partial potential to build plants.

What is lacking can be filled in, explains Prof Yiftah, by the acquisition of plans, assemblies, and components from countries which have begun to move in this direction (in addition to the countries which export power plants) such as Italy, Spain, Argentina, Brazil, and India who have been moving in the direction of self-production of nuclear assemblies and components.

Two nuclear plants will cost about \$2 billion. "And it is clear," contends the president of the Israeli Association for Nuclear Sciences, "that in light of the constant increase in the cost of oil and the problems involved in the logistics of coal, the nuclear plant is the most economical method today of producing electricity. We are spending today \$2.5 billion a year for oil. Moreover, the \$2 billion for the plants will not be required immediately, and the payments will be spread over 18 years. Moreover, every acquisition for a plant also entails the solution for funding on the part of its suppliers."

Where Will the Plants Be Built?

A nuclear plant will obviate necessity for the annual importation to Israel of 3 million tons of oil (or residual oil) or 5.5 million tons of coal. A plant will also free us to a significant extent from the dependence on a constant flow of oil. Along with the reactor, we acquire two loads of fuel sufficient for 3 years (!), and it is possible that Israel will also be able to extract uranium from its phosphates.

According to Prof Yiftah, Israel has the manpower qualified for the construction and operation of reactors. The nuclear technology, which requires much greater sophistication and a higher level of precision, will give a new impetus and dimension to Israeli industry. The technological infrastructure which will be formed in Israel will permit the construction of an additional reactor every 2 or 3 years because reactors are built in series.

However, the construction of nuclear power plants has not only aspects of manpower reserves and technological and financial resources. The nuclear issue arouses environmental sensitivities, and because of this the question of the location of the plants.

"The construction of a nuclear power facility," notes Alex Baq of Israel's Atomic Energy Commission in a study submitted to the conference of the nuclear associations, "will certainly change the character of the area of the construction site. For all the national importance attached to the production of nuclear power in a certain location, there must be assurances that the operation of the nuclear reactor there will not cause additional changes in the vicinity. If the radioactive material in the nuclear reactor leaks out, it would cause serious damage to the vicinity."

The expert adds that it is necessary, therefore, to select such locations which would reduce the probability for a nuclear accident in the facility and the effects on the vicinity. The Atomic Energy Commission considers it its national obligation to conduct extensive surveys in order to find the most suitable locations for the construction of nuclear reactors.

Prof Leon Majar, of the department of electrical engineering in the Technion, demands much more than this. He points out that as a result of the incident with the reactor in Harrisburg in the United States, he considers it proper to reemphasize the "It is customary in many countries (Switzerland, Austria, Germany, and others) before the construction of nuclear plants, to prepare a special law to protect the population from radiation. For a long time I have been making the effort to explain that a similar law is also necessary in Israel."

The question of the location, therefore, will be an important factor in the construction of the nuclear plants in Israel. In actuality, the following locations have been considered as possible sites: Haborim coast, Palmahim coast, Nizzanim coast, and Ziqim coast. The proximity to the coast stems from the fact that with the technologies available to Israel until a short time ago, the facilities could only be cooled with water along the seacoast. However, it is now possible to construct the first plant and the following ones in Halutsa or Mash'abbe Sade in the Negev. The cooling process will be accomplished by new methods--a damp dry cooling tower--or with water from the Mediterranean Sea which would be brought in through a pipeline.

Another cooling possibility would be created in the future if a canal is constructed which, according to the decision of the government, will traverse the Negev.

As far as is known, there was one public opinion poll conducted in Israel in 1974 on the issue of power plants. The poll was conducted by Public Opinion Research in Israel and consisted of several basic questions. The first one was: "In your opinion, is it necessary or unnecessary to build nuclear power plants in Israel?" To this question, 63 percent responded "yes", 8 percent responded "no", and 26 percent responded "no opinion."

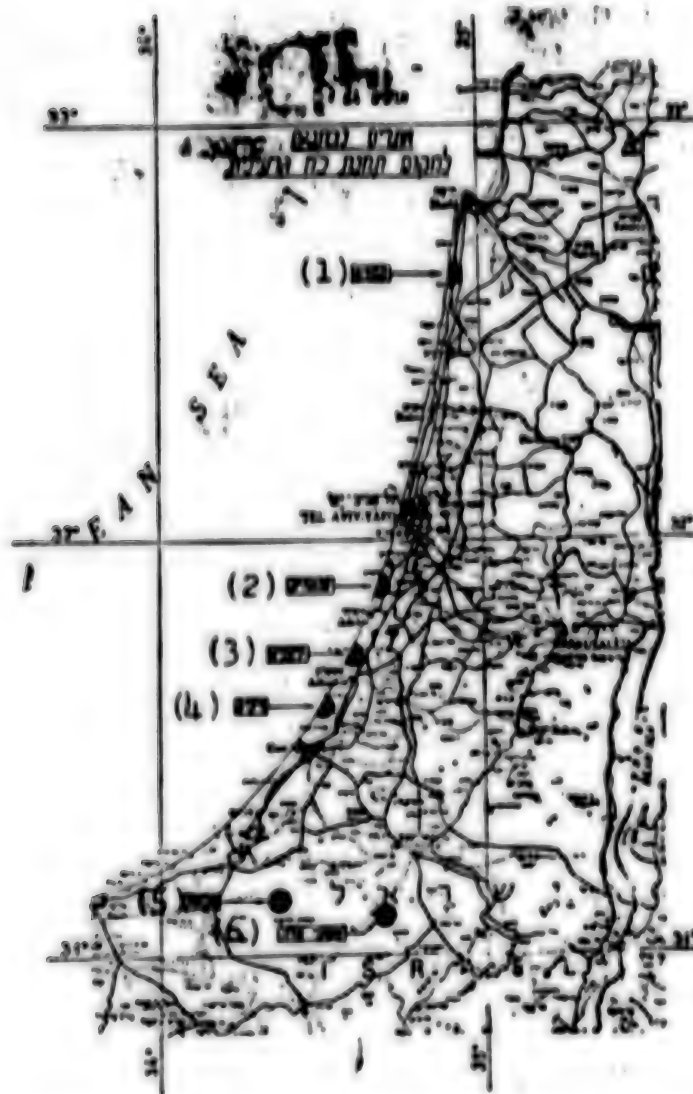


Figure 1. Places Being Considered for Nuclear Power Plants

Key:

- | | |
|-------------|-------------------|
| 1. Habonim | 4. Ziqim |
| 2. Palmahim | 5. Halutsa |
| 3. Nizzanim | 6. Mash'abbe Sade |

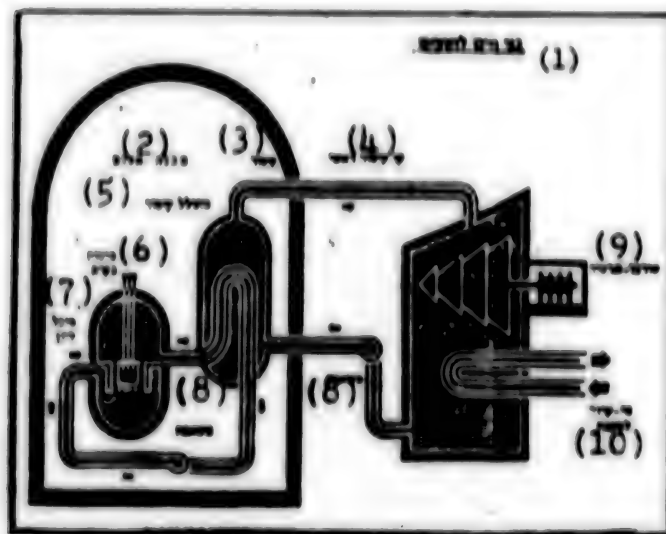


Figure 2. Operation of a Nuclear Reactor

Key:

- | | |
|------------------------------|--------------------------------|
| 1. Pressurized water reactor | 6. Control rods |
| 2. Sealed structure | 7. Pressure tank |
| 3. Steam | 8. Pump |
| 4. Main steam line | 9. Turbo-generator |
| 5. Steam producer | 10. Coolant water to condenser |

5830

CSO: 5100

BRIEFS

RADIOLOGY TRAINING PROGRAM--Khartoum, March 19 (SUNA)--The Sudanese Atomic Energy Commission has prepared a programme in collaboration with the U. of K. Faculty of Sciences to train cadres from corporations and institutions engaged in the use of X rays. The execution of the programme will be supervised by an expert from the International Atomic Energy Commission who arrived here lately to set up the project that would operate the technological laboratory for nuclear usages established with the International Commission's assistance at the Faculty of Sciences. The expert Mr Valkovich will spend some three weeks during which he will hold scientific lectures beside supervising technicians training in the use of X rays that aid to distinguishing elements and their various components. [Khartoum SUNA DAILY BULLETIN in English 19 Mar 81 p 7]

CSO: 5100

SENATE COMMITTEE APPROVES MONEY FOR NUCLEAR RESEARCH

Kaduna NEW NIGERIAN in English 25 Mar 81 p 7

[Article by Bala Dan Abu]

[Text] Senate Committee on Finance and Appropriation has approved 10 million Naira for research into the country's nuclear energy programme.

The amount was approved on Monday when the committee met to consider reports from various committees of the Senate on the 1981 Appropriation Bill.

The Senate Committee on Science and Technology had recommended in its report that 10 million Naira be provided in this year's budget for the conduct of the research programme.

The recommendation generated a lot of controversy among members of Finance and Appropriation Committee. Some members opposed the idea that the country should go nuclear.

Opposing the suggestion for the amount, Senator A. Zuofa said there was no need for the committee to approve the money because the executive did not ask for it in the budget.

Contributing also, Senator Jalo Waziri said the amount was worth the while and should be approved by the committee.

Senator Bitrus Kajal held that since the nuclear energy programme was a new one, 10 million Naira was small and therefore urged the committee to approve it without hesitation.

In his own contribution, Senator Muhmud Waziri said it was an oversight on the part of the executive for not asking for the money in the 1981 budget and urged the committee to recommend that the country should not hesitate to co-operate with any friendly nation willing to assist in the project.

The committee unanimously approved the amount following the promise by Senate Leader, Dr. Olusola Saraki, to get in touch with the executive on the progress made so far on the project.

Also during the meeting, the committee returned the letter of recommendation for the review of salaries of the two legal advisers to the Senate president and Speaker of the House of Representatives.

The two advisers had written to Senate President Dr. Joseph Wayas to effect the decision of the meeting of special advisers in Yankari that they should earn 15,000 Naira a year and not 14,000 Naira.

Dr. Wayas was said to have approved the request of the two advisers and urged the Finance and Appropriation Committee to effect the salary review and reflect it in the National Assembly vote for 1981.

Most of the committee members who contributed to the debate on this issue, including Dr. Olusola Saraki, were of the view that the committee had no powers to fix salaries for public officers.

The letter was therefore returned to Dr. Wayas for onward transmission to the appropriate committee.

CSO: 5100

BRIEFS

NUCLEAR RESEARCH AT UNIVERSITIES--Senate has approved five million Naira more to enable three universities to conduct research into the country's nuclear energy. This brings to 19 million Naira, the amount to be spent on research into nuclear energy for the country. The Senate Committee on Finance and Appropriation had earlier approved 10 million Naira for the project. The universities to benefit from the fund are the University of Ife, Ahmadu Bello University and the University of Nigeria, Nsukka. University of Ife and Ahmadu Bello University would conduct research into nuclear energy while University of Nigeria would concentrate on research into solar energy. Giving these details on Wednesday was the Chairman of the Senate Committee on Science and Energy, Senator Garba Matta, while pleading with the Senate to increase the money voted for the project to 15 million Naira. Senate also approved a subvention of 50,000 Naira to professional associations in science and technology in the country. Ministry of Science and Technology got a vote of 96.2 million Naira for its recurrent expenditure and 98.5 million Naira for capital expenses. [Excerpt] [Kaduna NEW NIGERIAN in English 28 Mar 81 p 3]

CSO: 5100

SOUTH AFRICA

BRIEFS

COURT CASE AGAINST NUF COR--Agreements have been reached in principle between Nuclear Fuels Corporation of South Africa and Westinghouse Electric Corporation and Tennessee Valley Authority to settle the private anti-trust actions brought by Westinghouse and TVA against Nufcor and certain US and foreign uranium suppliers which are now before the US District Court in Chicago. "In terms of the settlement," said a Nufcor statement, "which include a number of other defendants, Westinghouse will buy 9-million pounds of uranium for delivery over the years 1981-1985 at a firm price, subject to escalation, and will receive a cash payment of \$39-million. TVA will receive a cash payment of \$2 million. Part of the uranium to be bought by Westinghouse will be supplied by Nufcor but the company will not participate in the arrangements for cash settlement. "Nufcor will be dismissed from both actions without cost. There has been no admission of liability and no waiver of the objections to the jurisdiction of the US courts over the matters in dispute. "Certain judicial and other formal procedures are still to be completed and certain governmental consents and authorisations have got to be obtained before the settlement arrangements can be made final. For these reasons no further details can be given. [Text] [Johannesburg THE CITIZEN in English 18 Mar 81 p 10]

KOEBERG EMERGENCY EXERCISE--Cape Town--Escom carried out its first full-scale emergency exercise on the site of the Koeberg nuclear power station near Cape Town early yesterday.--Sapa. [Text] [Johannesburg THE CITIZEN in English 26 Mar 81 p 2]

CSO: 5100

FINNISH PAPER: USSR SCIENTIST ON URALS NUCLEAR ACCIDENT

Helsinki UUSI SUOMI in Finnish 9 Feb 81 p 3

[Pekka Walden article: "Old Assertion Confirmed--Nuclear Accident in the Soviet Union"]

[Text] Jyvaskyla--A powerful nuclear accident occurred in the Soviet Union in the 1950's which caused large areas of the southern Urals to be evacuated.

This assertion, long made in the West, was confirmed on Sunday 8 February by a member of the Presidium of the USSR Academy of Sciences, Academician M. A. Styrikovich, at the Jyvaskyla [University] winter energy conference. This was disclosed by Louis Puiseux, a professor from France.

The accident was said to have occurred in an area used for storing nuclear wastes from military industries. As a result, large quantities of strontium 90 and cesium 137 were dispersed, making habitation impossible over several hundred square kilometers. Academician M. A. Styrikovich claimed that the accident was symptomatic of the preliminary stage of nuclear development, and denied that there are dangers in the peaceful uses of nuclear energy.

CSO: 3107

GOVERNMENT POSTPONES DECISION ON HANDLING NUCLEAR WASTE

Oslo NORWEGIAN JOURNAL OF COMMERCE AND SHIPPING in English 11 Mar 81 p 19

[Text]

The Swedish Government have not decided as to what will happen to the radioactive waste from the country's nuclear power station. It is expected that the Swedish Government will reach a decision in ten year's time and that sometime in the 2,060's all radioactive waste from nuclear power stations will be buried for ever.

The solution the Government is considering and researching at the moment is the storage of nuclear waste 500 meters below the mountains. In several places in Sweden exploratory drilling is taking place in order to determine the rock formation's suitability, but this has not taken place without protest.

The Swedish Riksdagen, the Government and the local authorities have been swamped with letters of protest. In several places, including Bohuslan and Halsingland, the population have attempted to

prevent the test drilling. Over a week ago the police had to intervene at Halsingland in order that the exploratory drilling on Svartboberget could be carried out.

Until the problem of the storage of nuclear waste in the mountains has been solved, the waste must be temporarily stored. Such a storage unit is now being built at the nuclear power station in Oskarshamn on the Swedish East Coast. The installation, which can be taken into use in 1985, will have a capacity for 3000 tons of nuclear waste which will be stored for 25 years. 400 tons of nuclear waste from Finland will be stored at this installation.

Sweden also has an agreement with France about the building up of nuclear waste, but the Government has not decided as to whether the waste should be sent for building up to the French installation in La Hague on the Bretagne coast.

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DATE FILMED

April 27, 1981

